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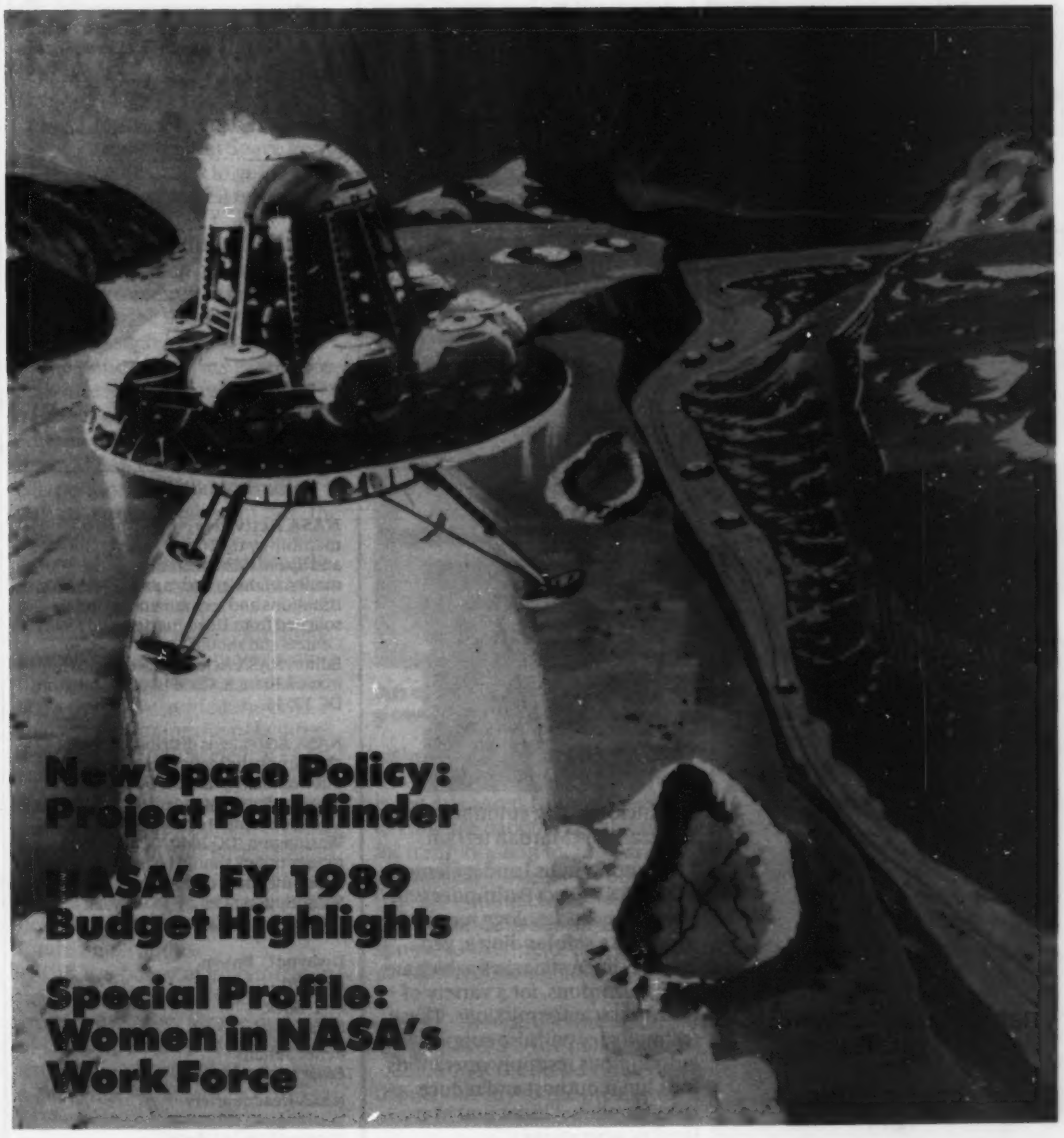

New Space Policy: Project Pathfinder

NASA's FY 1989 Budget Highlights

Special Profile: Women in NASA's Work Force

U. S. Depository Document

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A vehicle landing autonomously in hazardous Martian terrain.

The Autonomous Lander element of NASA's Project Pathfinder will provide the technology required to ensure a safe landing at geologically interesting sites, which are often hazardous, for a variety of potential science missions. These technologies will also support autonomous resupply operations for a lunar outpost and reduce risks for piloted lunar and Mars landing operations.

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AGENCY HIGHLIGHTS

National Space Policy Issued

(The following is an excerpt from the Statement of NASA Administrator James C. Fletcher, delivered in a February 11, 1988 press briefing.)

President Reagan issued a new National Space Policy designed to guide U.S. activities in space well into the future.

This policy confirms the basic goal of U.S. leadership in space and the President's strong commitment to the Space Station as the key to such leadership.

The policy reaffirms that space activities serve a variety of vital national goals and objectives. Among them are the strengthening of U.S. scientific, technological, political, economic, and international leadership. In fact, the new policy stresses that civil space activities contribute significantly to enhancing America's world leadership.

With the new policy, President Reagan has added a major new thrust to the objectives and directions that have guided the civil space program for the past three decades. The policy clearly establishes that, for the first time, the United States has a long-range goal of expanding human presence and activity beyond Earth orbit into the solar system.

This is a goal of enormous significance with potentially historic future implications.

This is a policy of investment in the future. It lays the necessary groundwork now for the decisions of the next century. It puts a challenge squarely on NASA. And it is a challenge we accept.

The new policy reaffirms the President's strong support for the Space Shuttle and for the permanently manned Space Station the United States is developing with the expected participation of its allies.

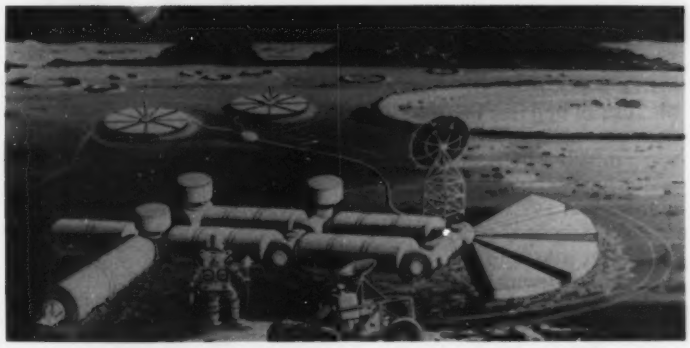
The President's policy stresses the unique and vital role of the Space Shuttle in the Nation's Space Transportation System. It calls for further enhancing the system's capabilities, as new requirements emerge, and for NASA and the Department of Defense to work together to develop new, cost-effective launch systems, one of which is the Advanced Launch System, to enhance national capabilities for transportation to, from and within space. The policy also states that the national security sector will continue to use the STS in response to that sector's specific mission requirements.

With regard to the Space Station, the policy states that the Station is to contribute directly to the preservation of U.S. preeminence in manned spaceflight and to the goal of expansion of human presence and activity into the solar system.

But to prepare for that development, the policy focuses appropriately on the near-term on the development and testing of the emerging, innovative "Pathfinder" technologies that will make future decisions possible. The Pathfinder program will permit a future Administration to act with confidence in deciding on specific manned exploration goals and timetables to meet them. In this area, as in several other areas, the policy recognizes the critical role that technology advances have played and will continue to play in preserving this Nation's leadership in vital areas of space activity and on Earth, as well.

The policy recognizes the existence of a separate commercial sector, as well, and reaffirms the President's strong commitment to encouraging a healthy and expansive commercial space industry.

I stress that last point because, although I've been addressing primarily the civil sector portions of the National Space Policy, the policy also says a great deal about commercial space. And in that regard, there has been a related effort underway to develop special initiatives in support of the President's thrusts to develop the commercial use of space. ■



An outpost on the lunar surface with space nuclear power units in the background.

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The President Increases NASA's Budget for 1989

(The following is an excerpt from NASA Administrator James C. Fletcher's statement delivered during the February Budget Press Conference.)

The President's fiscal year 1989 budget gives NASA what is needed to carry forward our on-going programs in space and aeronautics and to take the essential next steps to assure future United States' leadership in space.

The fiscal year 1989 NASA budget of $11.5 billion is a substantial increase over the amount appropriated for NASA in fiscal year 1988, for two main reasons.

First, the Space Shuttle will be flying again during fiscal year 1989 after more than a 2½-year hiatus. NASA will have to meet the costs of building the Shuttle flight rate up to approximately seven missions in fiscal year 1989 and to approximately 10 missions in fiscal year 1990.

Second, the Space Station will be moving into full-scale hardware development. The FY 1989 budget provides the normal build up in funding required in the second year of a major development program.

The fiscal year 1989 budget recognizes that these "built-in" increases are essential to carry out our national commitment to return the Space Shuttle to flight and to carry out the President's recommendation, now approved by the Congress, that the United States should proceed with the development of a permanently manned Space Station.

The Space Station will provide opportunities for invaluable contributions to life science and materials processing research, and expanded opportunities to observe the Earth, the solar system and the universe.

The Space Station will be an indispensable base for potential future manned lunar and Mars missions, whether they be undertaken unilaterally by the United States, or in cooperation with other nations. Only with such a permanently manned orbital base can the Nation develop the technology and systems needed to support U.S. participation in such ventures.

The NASA budget also reflects the high priority given by the President in his fiscal year 1989 budget to science and technology generally. Thus, the NASA fiscal year 1989 budget:

Carries forward a robust program in Space Science, including

1. Preparing major astronomy and planetary missions for launch when the Shuttle is ready;
2. Providing expendable launch vehicles for a number of future science missions; and

NASA's FY 1989 Budget Request (Dollars in Millions)

	FY 1987 Budget	FY 1988 Budget	FY 1989 Request
Space Station	420.0	392.3	967.4
Space Transportation Cap. Devt.	491.1	609.8	631.1
Space Science and Applications	1,547.6	1,575.8	1,859.6
Technology Utilization	15.7	17.7	19.1
Commercial Use of Space	25.2	56.0	38.8
Aeronautical Research and Technology	374.0	334.8	414.2
Transatmospheric Research and Technology	45.0	52.5	84.4
Space Research and Technology	206.0	223.6	390.9
Safety, Reliability and Quality Assurance	12.0	14.1	22.4
Tracking and Data Advanced Systems	17.1	17.9	18.8
Spaceflight, Control, and Data Communications	5,999.5*	3,810.7	4,841.2
Construction of Facilities	169.3	178.3	285.1
Research and Program Management	1,451.5	1,743.0	1,915.0
Total NASA	10,774.0	9,026.5	11,488.0

*Includes Fourth Orbiter

3. Initiating a major new "Great Observatory" project, the Advanced X-Ray Facility (AXAF).

Provides for major advances in technology, including development of a new Advanced Solid Rocket Motor (ASRM) for the Space Shuttle system; continuation of the expanded Civil Space Technology Initiative (CSTI) begun in fiscal year 1988; and a strong, continuing program in Aeronautics.

FY 1989 budget provides for major advances in technology.

This strong support for science and technology is one of the most significant priorities in the President's fiscal year 1989 budget. It reflects a recognition of the realities of the crucial roles of science and technology to the nation's future. This is clearly NOT the time to "freeze" or cut back in this vital area.

Very significantly, the fiscal year 1989 budget supports the President's new National Space Policy. This policy clearly commits the United States to space leadership as a fundamental national objective. The policy establishes that, for the first time, the United States has a long-range goal of expanding human presence and activities beyond Earth orbit into the solar system.

The President has set a long-range goal with potentially historic implications to guide civil space activities well into the next century. In so doing, he has provided strong direction for the country's civil space program in a difficult budget environment. It is now up to the Congress to support this major step forward in restoring U.S. leadership in space. ■

NASA's FY 1989 Budget Highlights

• Expendable Launch Vehicle	Continues funding for 2 DELTA II's (EUVE, ROSAT), initiates funding for 1 TITAN IV (planetary backup), 1 TITAN III (TDRSS or Mars Observer). Also provides funding for competitive procurement of ELVs for Wind, Geotail and Mars Observer or TDRSS; 2 scouts per year after 1991.	$195 Million
• Advanced Solid Rocket Motor	Advanced solid rocket motors for the space transportation system. Will provide increased lift capability to low-earth-orbit with planned operational capability by 1994.	$88 Million
• Pathfinder	Develops a broad set of advanced technologies to enable decisions on future ambitious space missions, including potential robotic and manned missions to the Moon and Mars. Includes initial funding of "Humans in Space" program at $13 Million in FY 1989.	$100 Million
• Aeronautical Research & Technology Enhancements	Focuses on advanced propulsion concepts, aeronautical safety and automation and provides for advanced data systems for NASA wind tunnels.	$65 Million
• Wind Tunnel Revitalization	A five-year program to restore, modernize, and improve capabilities of NASA wind tunnels. The program has been strongly endorsed by DOD, industrial users, and OMB who approved the entire program including runouts.	$64 Million
• Space Station Facilities	Provides for construction of Space Station processing facility (KSC), modifications to process technology facility (MSFC), and addition for space systems automated integration and assembly facility (JSC).	$28 Million
• Advanced Launch Systems Studies	Provides for NASA funding of system definition studies to examine vehicle and propulsion systems to satisfy unique civil requirements. DOD is the principal funding agency for joint DOD/NASA ALS program.	$13 Million

Safe Flight NASA's Top Concern

"Safety is Key—it's Number One," said Dr. Noel Hinners, NASA associate deputy administrator (Institutions), in response to press questions about the effectiveness of various safety and quality programs conducted in the aftermath of the Challenger accident.

In the 15 months since the new Office of Safety, Reliability, Maintainability, and Quality Assurance (SRM&QA) was created, NASA has made substantial progress in addressing and correcting the safety and quality issues raised in post-Challenger reviews.

"Quality and safety are not things that have been imposed on NASA. It is in our own self-interest that we treat all our programs diligently from the quality, safety, reliabiity, maintainability aspect," said Hinners.

"We have addressed two major issues. First is the return to flight of STS-26. The second is to develop long-term corrective action to ensure continued success," said George A. Rodney, associate administrator, SRM&QA.

The major areas of improvement include a reorganization of safety programs in NASA, an increase in the number of people assigned to safety and quality control programs, a larger budget, improved communications, and a better system to review the progress made in the safety areas.

The reorganization of safety and quality at NASA Headquarters and the field centers is of itself one of the most significant improvements accomplished to date. Established in July 1986, SRM&QA is headed by an associate administrator who reports directly to the NASA administrator, ensuring that the highest levels of NASA management are fully cognizant of significant safety and quality issues.

In addition to reorganization, NASA has seen a 30-percent increase in safety and personnel assigned to SRM&QA functions since January 1986. NASA now has approximately 1400 NASA civil service employees in the SRM&QA work force.

Quality and safety are not things that have been imposed on NASA. It is our own self-interest that we treat all our programs diligently from the quality, safety, and reliability aspect.

The budget for these programs has also increased. Resources committed to SRM&QA rose by 33 percent in FY 1988, supporting the upgrading of technologies which can contribute to improved safety and quality, such as nondestructive evaluation techniques.

"We will have completed the automation of the (safety and quality) program by mid-year. This permits us to better analyze the data and come up with corrective action. In addition, this system now tracks close calls...one of the key objectives of the whole program," said Rodney.

The SRM&QA office also has improved communications, a key area mentioned in virtually every post-Challenger review, by enhancing existing mishap reporting and corrective action systems and creating a new, additional avenue for NASA and contractor employees to communicate safety concerns: the NASA Safety Reporting System (NSRS).

The NSRS is generating reports which are in various stages of being evaluated and addressed. Its key value is in providing a quick, confidential means of surfacing a safety concern to management.

"It is a supplement to our regular reporting system," said Rodney. "It is voluntary and designed so that people who feel they cannot get their message through our normal system can communicate to management and maintain anonymity. We're averaging two to three reports of this nature a week," he said.

Other SRM&QA activities include strengthening risk management programs and initiation of significant problem reporting, trend analysis, and independent systems assessment capability. ■

Agencies Cooperate on New Launch System

President Reagan has signed a report to Congress creating a joint NASA and Department of Defense program for development of the Advanced Launch System (ALS).

The ALS is intended to provide a launch system that meets long-term national launch needs; is flexible, reliable, and responsive: and significantly reduces the costs of launching payloads into space. The program expects to reduce costs in all elements of the space

launch system including the launch vehicle, manufacturing, launch processing, logistics, data management, and automation.

The basic approach calls for completion of ALS design requirements and use of Government and industry expertise in all phases of the program with emphasis on maximum competition.

The report specifies that DOD and NASA work together to define and develop ALS, the program's design approach, management plan, costs, and test facilities.

The management plan creates a joint program office headed by an Air Force program manager with a NASA deputy program manager. This office currently exists at the Air Force Space Division in Los Angeles, Calif.

The report specifies that DOD and NASA work together to define and develop ALS, the program's design approach, management plan, costs, and test facilities.

In the management structure, DOD will manage the systems engineering and integration, vehicle, logistics, and payload module. NASA will manage liquid engine systems and focused technology efforts.

DOD will accept full funding responsibility for the program with any unique civil requirements, not addressed by the ALS baseline, being funded by NASA.

The ALS will make maximum use of Government testing facilities to meet ALS requirements. As the program matures and concepts are further developed, specific facilities will be selected for testing based on capability and availability. ■

NASA VISIONS

Space Shuttle Crew Announced

NASA announced crew members for Space Shuttle mission STS-28, currently targeted for late 1988. STS-28 will be a Department of Defense (DOD) mission aboard the Shuttle orbiter Columbia.

The crew will be commanded by Col. Brewster H. Shaw, Jr. (USAF). Pilot for the mission will be Cdr. Richard N. Richards (USN). Cdr. David C. Leestma (USN), Lt. Col. James C. Adamson (USA) and Maj. Mark N. Brown (USAF) have been assigned as mission specialists.

Shaw has flown previously as pilot on STS-9 and as commander of STS-61B. He was born May 16, 1945, in Cass City, Mich.

Richards will make his first Shuttle flight. Richards was born Aug. 24, 1946, in Key West, Fla., but considers St. Louis, Mo. his hometown.

Leestma has flown previously as a mission specialist on mission STS-41G. Leestma was born May 6, 1949, in Muskegon, Mich., but considers Tustin, Calif., his hometown.

Adamson will make his first Shuttle flight also. He was born Mar. 3, 1946, in Warsaw, N.Y., but considers Monarch, Mont., his hometown.

Brown also will make his first spaceflight. Brown was born Nov. 18, 1951, in Valparaiso, Ind. ■

From top left: David C. Leestma, Mission Specialist/ Astronaut Candidate; Richard N. Richards, Pilot/ Astronaut Candidate; James C. Adamson, Astronaut Candidate. From bottom left: Mark N. Brown, Astronaut Candidate; Brewster H. Shaw, Jr.

INSIDE NASA

Women in NASA's Work Force

From the Office of Harriett G. Jenkins, Assistant Administrator for Equal Opportunity Programs.

NASA continues to foster the growth of a more gender and culturally diverse work force. At the end of FY 1987, women represented 1,265 (10.8%) of the total scientists and engineers, a fourfold increase from 310 (2.6%) in 1974.

Advances have been made as evidenced in the increasing average grade of women in NASA. In 1974, the average grade for women stood at 6.1. By the end of FY 1987, it had increased to 8.4. The percentage of women working in mid and higher GS/GM levels has grown. At the mid-level, GS/GM 11-13, the number of women employed for NASA has increased from 473 (43%) in 1974 to 1962 (19.4%) at the end of FY 1987. Women's numbers have increased at the higher level, GS/GM-14 and above from 31 (0.6%) in 1974 to 256 (4.8%) at the end of FY 1987. Since the establishment of the Senior Executive Service in 1979, women have increased their representation from 7 (1.6%) to 16 (3.8%) at the end of FY 1987.

These positive trends for women in the NASA work force are the direct result of ensuring equal opportunity and the effective use of affirmative action as a management tool.

FY 1987 Accomplishments for Women

During FY 1987, NASA's EEOE office targeted six major areas for special emphasis. The focus was on the employment, development, advancement, and other factors that enhanced the employment opportunities of women; the development of a resource pool from which future female scientists, and engineers can be obtained, and contract awards to women-owned businesses.

Employment

During the past fiscal year, all NASA installations, except for the National Space Technology Laboratories, increased their representation of women in the work force. Women represented 914 (42.3%) of the agency's total hires. Of this total, 184 (20.2%) were in the scientific and engineering occupations and 123 (48.4%) were in the professional administrative occupations.

Two more women (Dr. N. Jan Davis and Dr. Mae C. Jemison) were selected for the Astronaut Candidate Program raising the total number of women astronauts to 13.

Development

Women represented 4,497 (31.2%) of NASA 's total training participants. They participated in agencywide management and executive development programs such as the NASA Management Education Program (MEP), a residential program designed primarily for GS/GM-15's and some GS/GM-14's who have demonstrated potential for higher level responsibilities; the Federal Executive Institute, the residential program for senior executives; the Simmons Middle Management Program; and the Pennsylvania State Program for Women in Management. Colleen Hartman was the recipient of the 1987 Dryden Memorial Fellowship. This fellowship provides for concentrated studies of long-range technical or administrative problems in NASA-oriented disciplines.

At several NASA installations, women have been selected to participate in rotational assignment programs. These six months to one-year assignments are performed at the Center Director or directorate level. For example, at the Marshall Space Flight Center, Sally Little served as the Executive Assistant to the Center Director. Furthermore, women continue to participate in each installation's Management Development Program; full- and part-time graduate study programs; undergraduate programs; and in Upward Mobility Programs.

Advancement

Women have been selected and appointed to such significant positions as Associate Administrator for Management (June Gibbs Brown), Director, Plans, Policy and Evaluation Division (Dr. Barbara Stone in NASA's Office of Commercial Programs), Executive Assistant to the Deputy NASA Administrator (Susan Cloud), Director, Payload Project Management (Jo Ann Morgan), Director, NASA Office of Personnel Programs and General Management (Ann Bradley), Chief, Medical and Environmental Health Office (Dr. Irene Long), Chief Bio Medical Laboratories Branch (Dr. Nitza Cintron), and Head, Oceans and Ice Branch (Dr. Nancy Maynard).

The representation of female supervisors and managers grew to 220 (6.8%) of the total supervisory/management work force by the end of FY 1987.

The progression of women through grade levels GS-11 to GS-18 continues to be positive. During FY 1987, women represented 596 (32.7%) of those promoted to GS-11 through 13; 360 (13.8%) of those promoted to GM-13 through GM-15; and 256 (7.4%) of those promoted to GS-14 through GS-18.

Other Employment Enhancement Factors

NASA's efforts to ensure that women are represented in all areas of development and advancement are indicative of their commitment to ensuring the full participation of women in all facets of the organization. Women have served on high visibility and challenging task forces, boards and committees. They have been encouraged and supported in their participation in professional associations. For example, Kathleen Harer is currently serving as the President of the Society of Women Engineers.

As a result of the participation, women have been recognized for their contributions by receiving merit pay, honor, and cash awards at NASA. During FY 1987, women represented 36.7 percent of those receiving quality increases. In addition, a number of prestigious national individual awards have been bestowed on many women for their active participation and in recognition of their outstanding technological achievements. Dr. Christine Darden was the recipient of the 1987 National Candace Award for Achievements in Science and Technology. Dr. N. Jan Davis was named "Outstanding Young Aeronautic Engineer" by the American Institute of Aeronautics and Astronautics.

Other factors that contributed to the retention and employment of women (and men) were the establishment of on-site Child Care Centers and employee awareness seminars.

During FY 1987, a child care center was added at NASA's sixth installation. This fiscal year, two of the six NASA installations doubled the size and capacity of their child care centers.

All NASA installations provided forums during Federal Women's Program observance; Women's History Month and National Secretaries Week where employment issues related to women were addressed by senior NASA managers and/or notable guest speakers. The prevention of sexual harassment was addressed through policy statements signed by the Center Director, during Equal Opportunity and other employee-related training programs, and through posters located throughout the installations.

Development of a Resource Pool

Women continue to serve as role models and to be involved in career days, science fairs, summer programs and year-long academic enrichment programs to encourage girls to consider and prepare for careers in science and engineering.

During this past fiscal year, the NASA Equal Opportunity Council, composed of senior NASA managers, adopted an agencywide five-year Federal Women's Program initiative entitled "Women in Science and Engineering Scholars Program." Under a grant to Spelman College, this program provides scientifically talented students from groups underrepresented in scientific and engineering fields with the opportunity to pursue undergraduate studies in science and engineering and to participate in summer research experiences. The program is designed to increase the number of women in

Center Deputy Director Paul F. Holloway, on behalf of the Federal Women's Program, presents Barger with a corsage as a token of appreciation for her many contributions to the research effort at Langley.

Federal Women's Program Honors Langley Retiree

Beulah "Boots" Barger, formerly of Systems Engineering and Operations Directorate at Langley Research Center, was honored at a fall Federal Women's Program for her many contributions to the research effort during her 26-year career with NASA. Barger began her career in 1944 as one of the pioneer women hired to perform "vital war work." She served as a seamstress for the NACA, the only position in the agency of its kind. From 1944 to 1970 Barger fabricated parachutes, drag devices, and flotation collars that allowed the safe recovery of scientific payloads worth millions of dollars.

science and engineering careers. In FY 1987, 15 Scholars were selected for participation in the program. The Scholars' average grade was 3.6 and average SAT score was 1110.

Women-Owned Businesses

Another significant area targeted for special emphasis last fiscal year was women-owned businesses. The contract awards to women-owned businesses grew from $47,748,000 in FY 1986 to $52,169,000 in FY 1987, a 9.3 percent increase.

Women-owned businesses are involved in providing services concerned with information systems, construction, manufacturing, mechanical contracting, mechanical equipment, security requirements, and technical and management services.

FY 1988 Outlook for Women

The FY 1988 outlook continues to be very positive for women seeking employment with NASA, obtaining information about how to prepare for career opportunities at NASA, and competing for opportunities to do business with NASA. This prognosis is based on two contributing factors. One, the continued involvement and commitment of NASA's senior-level management and two, the effective use of affirmative action as a means of managing human resources. Both of these factors have contributed significantly in the past to this agency's ability to successfully employ, develop, advance and retain women.

In summary, women have made significant progress in NASA. NASA is committed and has the management tools necessary to continue this progress. The agency recognizes that there is still work to be done on increasing the representation of women, particularly above journey level, in supervisory and managerial positions, and on increasing the average grade of women at NASA. ■

Name: Mae C. Jemison (M.D.) Astronaut Candidate (Mission Specialist)

Birthplace and Date: Born October 17, 1956, in Decatur, Alabama, but considers Chicago, Illinois, to be her hometown. Her parents, Charlie and Dorothy Jemison, reside in Chicago.

Physical Description: Black hair, brown eyes; height: 5 feet 9 inches; weight, 140 pounds.

Education: Graduated from Morgan Park High School, Chicago, Illinois, in 1973; received a bachelor of science degree in Chemical Engineering from Stanford University in 1977 (also fulfilled the requirements for a B.A. in African and Afro-American Studies), and a doctorate in Medicine degree from Cornell University in 1981.

Marital Status: Single

Recreational Interests: She enjoys drafting, graphics, photography, sewing, skiing, collecting African Art, has an extensive dance and exercise background, and is an avid reader.

Organizations: Member, American Medical Association, American Chemical Society.

Special Honors: National Achievement Scholarship (1973-1977); Stanford representative to Carifesta '76 in Jamaica; 1979 CIBA Award for Student Involvement; American Medical Student Association (AMSA) study group to Cuba; Grant from International Travelers Institute for health studies in rural Kenya (1979); organized New York city-wide health and law fair for National Student Medical Association (1979); worked refugee camp in Thailand (1980).

Experience: After graduating from Cornell in 1981, Dr. Jemison completed her internship at Los Angeles County/USC Medical Center, and from the fall of 1982, was a General Practitioner with INA/Ross Loos Medical Group, Los Angeles, California. From January 1983 to June 1985, Dr. Jemison managed the health care delivery system for the U.S. Peace Corps and U.S. Embassy personnel in Sierra Leone, Liberia. Her task as Area Peace Corps Medical Officer included provision of medical care, management of pharmacy, laboratory medical records, medical administration, and supervision of medical personnel. She developed curriculum for and taught volunteer personal health training, and wrote manuals for self-care. She developed and implemented guidelines for public health of volunteer site job placement, training site management, and other health/safety program issues. Dr. Jemison developed and participated in research projects on Hepatitis B vaccine, schistosomaisis and rabies in conjunction with the National Institutes of Health and the Center for Disease Control. On return to the United States, Dr. Jemison joined the CIGNA Healthplans of California, in October 1985, and was a General Practitioner in Los Angeles when selected to the astronaut program.

NASA Experience: Dr. Jemison was selected as an astronaut candidate by NASA in June 1987 and, in August, commenced a one-year training and evaluation program, completion of which will qualify her for subsequent assignment as a mission specialist on future Space Shuttle flightcrews. ■

CENTER HIGHLIGHTS

What's It Like to Work at Headquarters?

By Eileen Fritsch, LeRC

If a project you've worked long and hard for has ever been adversely affected by a seemingly unreasonable decision made at Headquarters, then your image of Headquarters may not always be very positive. At one time or another, many of us have either heard or expressed disagreement with certain policies and decisions made at Headquarters.

But what if you worked there? Would you do things differently? Maybe...maybe not.

Three Lewis employees who recently spent a year at Headquarters as part of the Professional Development Program (PDP) said it was an eye-opening experience that gave them much greater insight into why things are done the way they are.

Research physicist Joe Kolecki, of the Power Technology Division, learned that decisions that are perfectly logical from a technical standpoint also must be critically examined in terms of their economic, social, political, and even international implications. Arguing for a project from a strictly technical point-of-view often just isn't enough.

Working at Headquarters also enables you to meet the key players, make valuable contacts, and understand the unwritten rules of the game, according to chemical engineer Julio Acevedo, also of the Power Technology Division.

"I've got a much better understanding of who is responsible for what, the way they like to get things done, and how they react to things," said Maury Blanton, a position classification specialist in the Personnel Division. He pointed out that PDP participants not only meet their counterparts at Headquarters, but also top officials from all of the major offices at Headquarters. PDP participants sit in on high-level NASA and interagency meetings and attend congressional hearings.

Headquarters staff live in a different world than we do, said Kolecki. Theirs is a world of schedules, budgets, plans, and interagency relations; he explains: "They're technically knowledgeable—they must be in order to do what they do—but they don't do the technical work. Instead they take technical material from the field centers and use it." Just as researchers here assume that the project budgets and schedules created by Headquarters are in place, Headquarters staff assume that the technical information from the centers is correct.

Another difference between Headquarters and Lewis is that the

Aerial View of NASA Headquarters in Washington, DC. The National Aeronautics and Space Administration Headquarters offices are located in three office buildings near the U.S. Capitol in Washington, DC. The three buildings are located just south of the Mall, halfway between the Washington Monument and the Capitol.

NASA Headquarters is located in Federal Office Building No. 6 (FOB-6), at 400 Maryland Avenue, S.W. The building is jointly occupied by the Department of Education and NASA.

How To Apply For The Professional Development Program

The Professional Development Program (PDP), coordinated by the Training and Development Branch, is open to NASA professional personnel (GS/GM 13 through SES; occasionally GS-12's may also apply).

If you wish to be considered, first discuss your interest with your supervisor and if appropriate, apply through your organization. An official call for nominations is made each July for the PDP which begins in August of the following year.

Directorates then submit nominations on Form 1591. The nominations must describe how the individual and the organization would benefit, the desired work assignments, and plans for re-entry to center.

Nominations are reviewed by the Center's Executive Resources Panel which recommends candidates to the Center Director for submission to Headquarters.

For more information about the Professional Development Program contact Marsha Nickols at Headquarters (202) 453-8692. ■

pace and pressures are much more intense at Headquarters. "There was a new problem to attack every day," said Acevedo "Everything was constantly evolving."

If Headquarters staff sometimes seem too serious, rude, or demanding, it's only because of the unrelenting pressure, Acevedo believes. In reality, they are very down-to-earth and sociable. Acevedo recalls the many times he and his co-workers in the Office of Aeronautics and Space Technology went out after work to unwind and enjoy themselves. As a joke, his new friends at Headquarters presented him with an official-looking letter, allegedly "signed" by a top official, stipulating that the next person to hold his position must be as good a dancer as Julio Acevedo.

Professional Development Program

Kolecki applied for the Professional Development Program because, "I was curious about what went on in that side of the world. I've seen the research side for 18 years; I've always wondered, literally, what do the bureaucrats do?"

During the year, he worked in the Office of Space Flight, primarily helping lay the groundwork for a NASA policy on the problem of orbital debris. He gathered data from Marshall, Johnson, and Ames, worked with employees from other Headquarters offices, and prepared the first in a series of presentations to the Office of the Administrator. Kolecki also had an opportunity to work in program management for geostationary platforms and tethers.

Maury Blanton points out that Professional Development Program participants not only meet their counterparts at Headquarters, but also top officials from all of the offices. PDP participants have the opportunity to sit on high-level NASA and interagency meetings and attend congressional hearings. ■

Strategy Spawns New Initiatives Office

By Kelly Humphries, JSC

Bill Huffstetler will lead a team of 20-year-plus NASA veterans in managing the New Initiatives Office just established by JSC Director Aaron Cohen.

The New Initiatives Office (Code IA) will serve as JSC's focal point for new project development and as liaison with Headquarters, other agencies and private industry for future project development and activity, Cohen said.

"The exploration and exploitation of space by American astronauts will force us to develop new solutions to old problems and create new technologies to meet new challenges," Cohen said. "The New Initiatives Office will focus JSC's activities in that area and help translate ideas into full-scale approved projects."

Huffstetler, who joined NASA in 1962 and most recently was assistant director of engineering, said the office is being formed in direct response to 1987 Strategic Planning activities that identified JSC's three primary goals as the Space Shuttle, the Space Station and development of technologies needed to achieve future space program objectives. The new office will use JSC's existing expertise to focus efforts that previously were dispersed throughout the Center.

An enthusiastic core staff has been identified and will be housed off-site in the Vanguard Bldg. A small group of about 90 people initially will comprise the new office, including about 65 civil servants, some contractor management support and detailees from other organizations, he said. Key personnel assignments include:

Jerry Craig, deputy manager of the Space Station Projects Office, will become manager of the Crew Emergency Return Vehicle Office (Code IA131).

William Milligan Jr., deputy manager of the Flight Projects Office, will become manager of the Advanced Projects Definition Office (Code IB).

Harry Erwin Jr., manager of the Flight Projects Office, will become manager of the Technology and Commercial Projects Office (Code IC).

Curtis LeBlanc, manager of the Project Implementation Office, has a new assignment as manager of the Flight Projects Office (Code ID).

Mark Craig, special assistant to the Engineering director, will become manager of the Lunar and Mars Exploration Office (Code IZ).

Assignments of Senior Executive Service members Huffstetler and Jerry Craig will be on an acting basis until approved by Headquarters.

"The directorates will provide all the science, engineering and operations support," Huffstetler explained. "We will not build up that capability internal to this organization; we will develop project and technology tasks in direct support of center and directorate goals."

NASA Director James C. Fletcher approved establishment of the New Initiatives Office when he signed off on JSC's new organizational structure in September 1987. The new JSC office will respond to Headquarters requests for studies and analyses. Regular contact is expected with the Office of Aeronautics and Space Technology, the Office of Space Science and Applications, the Advanced Programs area of the Office of Space Flight, advanced development activities in the Office of Space Station and the Office of Commercial Programs.

"We'll be dealing with almost all the codes that sponsor technologies and new missions. Our major interface, of course, is with Code Z, the Exploration Office in Washington. Right now we have a job to do on lunar base and a humans to Mars mission, developing scenarios from which we will define requirements and cost estimates." ■

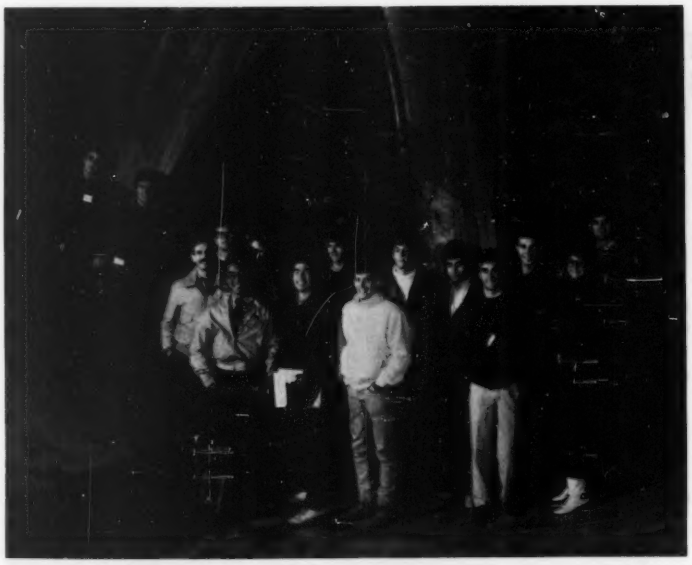
Langley Hosts University Advanced Design Program for Aeronautics

By Marny Skora, LaRC

Students and faculty members from U.S. engineering schools gathered at the Langley Research Center for the aeronautics winter conference of the University Advanced Design Program.

The objective of the NASA/Universities Space Research Association University Advanced Design Program is to bring together NASA engineers with students and faculty from U.S. engineering schools by means of integrating current and future NASA space and aeronautics engineering design projects into the university engineering design curriculum.

Approximately 45 faculty



Gathered in the 14- x 22-foot wind tunnel are some of the student participants in the aeronautics winter conference of the University Advanced Design Program.

members, students and engineers from various NASA centers attended the conference.

The NASA/USRA University Advanced Design Program has been an effective mechanism for integrating the educational objectives of the university community with the advanced engineering design interest of the NASA centers.

The aeronautics conference provided the opportunity for the universities to report on the results of their design projects. The oral reports were made by students representing the design team who worked on the project during the academic year. Presentations in past years have evoked considerable discussion, particularly among schools that have taken somewhat different approaches to similar design topics.

Topics addressed this year included "Hypersonic Transport Aircraft for Commercial Trans-Pacific Flight," "The Apollo Lightcraft Project," "High Speed Passenger Transportation System," "Hypersonic Vehicle Design: Advanced Aeronautical Design-Hypersonic Drone," "VSTOL Aircraft Concepts," "Supersonic (M = 3-6) Transport," "Supersonic Transport with TransPacific Range," and "High Speed Civil Transport."

The NASA/USRA University Advanced Design Program is operated by the Universities Space Research Association under grants from NASA Headquarters in Washington, D.C.

University participants were Case Western Reserve University; Rensselaer Polytechnic Institute; Ohio State University; University of California Polytechnic State University, San Luis Obispo; California State Polytechnic University, Pomona; University of Kansas; and Purdue University. North Carolina State University and the University of Virginia were guests at the conference.

In addition to the Langley Research Center, representatives from NASA's Ames Research Facility, Johnson Space Center and NASA Headquarters also attended. ■

Marshall's Economic Impact Assessed

By Bob Lessels, MSFC

It's no secret that the Marshall Space Flight Center is one of the major contributors to the economic success currently enjoyed by Huntsville and the northern Alabama region. Just how great that impact has been during the fiscal year which began Oct. 1, 1986 and ended Sept. 30, 1987, is shown in an end-of-year economic impact assessment recently compiled by the Center.

The Center contributed $603.7 million to Alabama's economy: $129.8 million in Federal salaries, $56.2 million in locally procured services and travel, and $417.7 million to prime contractors, subcontractors, and local construction firms. During fiscal year 1987 (FY 1987), Alabama ranked second among states receiving research and development (R&D) funding from the Marshall Center. Of $1.887 billion in R&D expenditures by the Marshall Center, Alabama received $436 million.

Marshall's is one of nine NASA installations which last year received about 20 percent of the agency's funds: $2.1 billion from NASA's total budget of $10.6 billion. This was the largest budget in the Center's history. Since the Center was established 27 years ago, it has received a cumulative total of $31.3 billion, with the largest share, some $20.1 billion going for research and development programs. Federal salaries paid during the past 27 years total $2.7 billion.

Considering both civil service and contractor employees, and assuming an average of 2.66 per-

sons per employee family, plus supporting service needs, about 15,000 of the immediate Huntsville area's population consists of center employees, their families, and persons providing support to the employees. Center employees paid $5 million in state income taxes last fiscal year. As far as contributing a fair share to charity, center employees gave more than $285,000 to this year's Combined Federal Campaign. After retirement, employees of the Center tend to remain residents of the Huntsville area, contributing an estimated $40 million to the area economy.

In addition to NASA's capital investment at Marshall, its component installations in Louisiana and at contractor-operated facilities elsewhere total more than $912 million acquisition cost, of which $627 million is on-site at the Center in Huntsville.

During FY 1987, 33,330 persons visited the Center on business. However, 159,390 visitors toured the Center via the bus tour offered by the Alabama Space and Rocket Center. ASRC's total receipts for the past fiscal year totaled about $13 million. Many of the museum's exhibits were provided by NASA and/or the Center. One exhibit, the Saturn V rocket, was designated a national landmark this year, and an area of ASRC was named Shuttle Park as a memorial to the crew of the Challenger.

The Center and Huntsville's universities share a strong mutual interest and bond. The driving force behind the establishment of the University of Alabama at Huntsville was to support the missile and aerospace concentration of Government and industry.

Although not included in the FY 1987 data, the recently announced U.S. Space Station Development effort is certain to further boost the area economy. ■

Architects Will Design a Tribute to America's Space Pioneers

By Beth Dickey, KSC

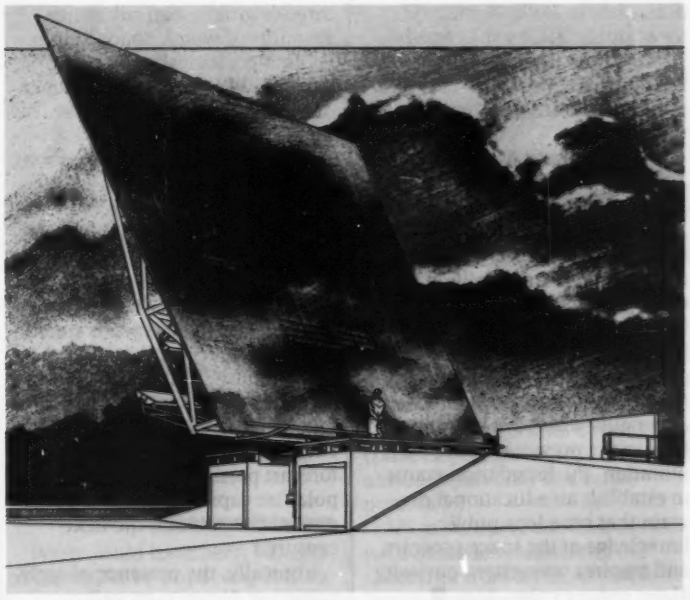
The Astronauts Memorial Foundation selected four San Francisco, Calif., architects who will design a national tribute to America's space pioneers. They are Paul Holt, Marc Hinshaw, Peter Pfau and Wes Jones.

The Astronauts Memorial Foundation sponsored the design competition and plans to spend $3-$4 million for construction of the monument on a six-acre site near the entrance to Spaceport USA. An estimated 2.5 million visitors each year and 6000 employees each day will pass by the memorial, which is scheduled to be dedicated in January 1990.

With "Space Mirror," the architects, principals of a firm which bears their names, won the first prize of $25,000 and the exclusive rights to negotiate the commissions for a NASA-approved memorial design.

The memorial, 50 feet wide and 40 feet high, has a mirror-finished surface of granite which tracks the sky, following the Sun's movement. The names of 14 fallen astronauts are grouped by final mission and cut like stencils through the granite. Behind each group of names are mirrors which direct sunlight through the names toward the heavens.

"The sky becomes the field of honor across which the heroes' names are emblazoned," explained architect Wes Jones. "By placing the viewer into the vastness of the sky, the memorial attempts to evoke a contemplative



feeling that is at the same time charged with the grandeur of the sky itself."

Jones said the design intends to express "the spirit of the space program, the spirit of the astronauts' quest for a better understanding of the universe."

Commenting on the memorial design, architect Ralph Johnson, a member of the design competition's jury, said, "I think what we found was a very poetic use of technology." Johnson and fellow jurors reached a unanimous decision on the winning design, following three days of deliberation on the Space Coast.

Johnson, a principal of Perkins & Will of Chicago, chose the winner with Hideo Sasaki, principal of Sasaki Associates of San Francisco; Michael J. Pittas, urban designer and initiator of the Vietnam Memorial Design Competition; John M. Dixon, editor of Progressive Architecture; and Alan C. Helman, chairman of the Astronauts Memorial Foundation. Charles Hollinshead, director of public affairs at Kennedy Space Center, and Dr. Robert W. Brown, director of NASA's Educational Affairs Division, were nonvoting jurors.

The Astronauts Memorial Foundation was formed in February 1986 in the aftermath of the Challenger accident. The national, non-profit foundation has raised more than $4 million, mostly from the sale of Florida license plates commemorating STS 51-L, to achieve its two-fold goal. In addition to building and maintaining a memorial honoring astronauts who have lost their lives in the pursuit of space exploration, the foundation wants to establish an educational program that broadens public knowledge of the space program and inspires youngsters' curiosity about space exploration. ■

Early Venus May Have Had Oceans According to New Planet History

By Peter Waller, ARC

Venus may have had hot, planet-spanning oceans for hundreds of millions of years before it lost them, according to a new planet evolution theory and Pioneer spacecraft data.

The new history for Earth's twin planet solves several Venus mysteries. It explains many of the extreme conditions found on Venus today.

Called the wet greenhouse theory, the explanation was developed by Drs. James Kasting, Tom Ackerman, and James Pollack of Ames Research Center.

The work suggests that Venus had relatively Earth-like conditions during its early history. It also suggests (as many scientists now believe) that Venus, Earth, and Mars formed from similar interstellar materials, and that all three originally had substantial amounts of water. Spacecraft may yet find geological and erosion evidence of early bodies of water on Venus, as they already have on Mars.

The wet greenhouse theory with its oceans far better explains Venus than the "runaway greenhouse" model now used. It accounts for the first time the almost completely waterless state of the present-day planet. It also explains where the planet's missing oxygen is stored.

(Scientists report that related "greenhouse" conditions on Earth, created by the burning of fossil fuels, are heating the Earth's environment. A number of them forecast partial melting of the polar ice caps and flooding of coastal cities within the next century.)

Ironically, the presence of early oceans on Venus may well account for the incredibly dry condition of today's planet.

Venus today is a scorching, hell-like place—totally dry, with surface temperature hotter than the melting point of zinc (800 degrees F) and an enormously heavy, largely carbon dioxide atmosphere, 100 times as dense as Earth's.

Venus' original atmosphere—of about 4 billion years ago—is believed to have been much like its atmosphere today: many times denser than Earth's and mostly carbon dioxide.

Dr. Kasting's "wet greenhouse" theory suggests that this enormous primordial atmosphere was reduced to a small part of its original mass by ocean-planet interactions. This would have left Venus' atmosphere about the same size as Earth's. The thin Earth-like atmosphere then lasted several hundred million years. Eventual loss of most of the water from such a thin Earth-like atmosphere would have stripped the planet of its water, leaving it bone dry as Venus is today.

By contrast, the currently accepted "runaway greenhouse" theory assumes the continuous presence of an extremely heavy atmosphere. Loss of the same proportion of water from this atmosphere still leaves us with far too much water—100 to 1000 times what we actually find on Venus.

The old and new theories go as follows:

In the runaway greenhouse, Venus' huge primordial atmosphere would have trapped much of the Sun's heat, preventing formation of any oceans at all, and creating a dense water vapor-carbon dioxide atmosphere. An immense amount of water vapor would

have risen to the top of the atmosphere. Solar ultraviolet radiation would have split (dissociated) the water molecules into hydrogen and oxygen. The hydrogen (the lightest gas) would have blown away to space by the super-fast hydrodynamic escape process—and been lost forever—destroying this water.

However, highly efficient hydrodynamic escape would have stopped when water was reduced to a minor constituent of the atmosphere (around 20 percent). But even 20 percent of an enormous atmosphere like Venus' is still a lot of water, and much of this water should be left on the planet today. However, the four atmosphere probes of NASA Ames' Pioneer-Venus spacecraft didn't find it there.

This amount of leftover water would be enough to make an atmosphere (if it consisted of nothing else but water vapor) 10-20 times as dense as the entire atmosphere of Earth. ■

Search for Water on Moon Urged

A mission to look for water at the Moon's polar latitudes with a gamma ray spectrometer has been proposed by a JPL scientist, Dr. Albert Metzger, Section 326.

Metzger proposed the low-cost mission in an abstract and presentation before the Fall Meeting of the American Geophysical Society in San Francisco.

"The actual presence of water as trapped ice would not only be scientifically significant but would have major implications on future operations on the Moon," said Metzger.

Water could have been brought to the Moon by impacting comets.

Water could have been brought to the Moon by impacting comets and meteorites, or may have been expelled from the interior in the body's geological past.

It also may have been transformed from hydrogen in the solar wind by chemical reaction.

He said a successful experiment could be performed from a low-altitude spacecraft in a lunar polar orbit.

JPL is studying the feasibility of such a mission, launching the spacecraft from an expendable launch vehicle. ■

DID YOU KNOW

Supernova Computer Bulletin Board Begun

The Space Telescope Science Institute, by arrangement with the Information Systems Office and the Astrophysics Division at NASA Headquarters, has established the Astronomy Information Service (ASTIS) to provide a forum where observers and theorists can discuss and share new developments. This bulletin board utilizes electronic mail to provide supernova researchers with a speedy alternative to written communications. Astronomers can access ASTIS through SPAN, ARPA Internet, X.25 and NASA Science Internet. ■

MIR Watch Hotline Now Available to Public

Anyone in the continental United States can now call the National Space Society's Mir Watch Hotline, (202) 546-6010 between 8:30 am and 3:30 pm CST to find out the best time to see the Soviet space station Mir pass overhead. ■

American Space Network Gearing Up

The American Space Network, a new television network devoted to advances in aviation, space and astronomy, is gearing up for 24-hour satellite transmission. The network's creators are expecting major cable distributors to pick up the service. ■

Lockheed Forms Satellite Operations Company

Lockheed has formed a new company dedicated to supporting the Consolidated Space Test Center located at Onizuka Air Force Base in Sunnyvale, Calif. Lockheed Technical Operations Co. (LTOC), a subsidiary of Lockheed Missiles & Space Co., provides uninterrupted satellite command and control with 1,000 employees. Sam Araki, president of Lockheed's Space Systems Division, is president, and Dan Tellep, president of Lockheed Missiles & Space Systems Group, is board chairman. ■

Q&A

NASA Principal Investigations:
The following questions and answers are taken from interviews conducted for NASA's radio program, The NASA Space Story.

Return to the Moon

NASA celebrates its 30th birthday in 1988. In reaching that astronautical era, the space agency has begun to define future ports of call for expeditionary crews of astronauts. Many space planners believe the United States could establish a permanent base on the moon in less than 20 years.

Q Why return astronauts to the moon? What can be learned?

A According to the head of NASA's Office of Exploration, John Aaron, "The thing that we must study and look at in terms of expanding human presence beyond the Earth into the solar system is the establishment of a permanent lunar base on the Moon and the eventual exploration of Mars with human exploration missions."

Aaron says, "It is both the fact that the lunar base is a very exciting scientific outpost, potentially, as well as that it is a natural proving ground from which we can learn to live and work and sustain ourselves on another celestial body."

The celestial body could well be 200 million miles away on the red planet Mars—a far-away world with a landscape unparalleled in the solar system.

Gravity Probe B

NASA scientists are working on an experiment called Gravity Probe B to test some of Einstein's most exotic theories about gravitation. The scientific satellite will be placed in orbit in the 1990's. Onboard will be four of the most perfect gyroscopes ever made which will be able to measure miniscule forces caused by the actual dragging of space and time around the spinning Earth.

Q Why measure miniscule forces caused by the actual dragging of space and time around the Earth?

A ccording to Dr. Francis Everitt of Stanford University, "This new force is as different from ordinary gravity as magnetism is different from electricity. It has never been detected. It's a crucial consequence of Einstein's Theory. It appears, we suspect, that it has enormous consequences in astrophysics around objects like black holes. We also have reason for thinking that it is one area where Einstein's Theory might even break down, yet it has never been investigated at all."

Gravity Probe B's spinning gyroscopes will be aligned with fantastic accuracy, so that even the tiniest shift in their orientation would be proof that Einstein's 70-year-old theory about the basic forces of nature are correct. ■

Shown here is an artist's illustration depicting a lunar mining operation.

NASA NEWS CAPSULES

Press Release Summaries are intended for use in NASA field center house organs and other internal communications. The stories are based on NASA Headquarters News Releases and on press association stories on NASA activities. The stories are edited by the Internal Communications Section, Office of Communications.

■

Proposals Selected for New Space Exploration Studies

NASA has authorized studies to determine the feasibility of launching a new generation of unmanned scientific spacecraft to better understand black holes, distant quasars, nucleosynthesis solar particles and unexplored layers of the Earth's atmosphere.

These studies were submitted to NASA under the Explorer Concept program, designed to develop intermediate size scientific experiments. For the past 10 years, an explorer mission—the International Ultraviolet Explorer—has provided data on numerous astrophysical objects, most recently the nearby Supernova.

Currently under development are several explorers to be launched in the early 1990's to study the cosmic microwave background, extreme ultraviolet from nearby stars and transient x-ray sources.

One or more of the new studies could result in a mission to be launched in the mid-1900's by the Space Shuttle or by expendable rockets.
(from Hdqs. Release #88-17)

■

Advanced Imaging Space Radar Completes First Field Tests

Researchers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., are completing the first field tests of a new, sophisticated spaceborne radar system.

The system, a multi-frequency imaging radar polarimeter, was tested over the San Francisco Bay area in January and February aboard a DC-8 airplane based at NASA's Ames Research Center, Moffett Field, Calif.

At aircraft altitudes, the system is able to detect objects as small as 39 feet across. The system's capabilities are useful in such areas as determining forest types, measuring ages of geologic features and analyzing crop types.
(from Hdqs. Release #88-19)

■

Space Science and Applications Advisory Subcommittee Established

NASA has established the Space Station Science and Applications Advisory Subcommittee to continue the coordination and communication activities begun by the Task Force on Scientific Uses of the Space Station.

The new group is a joint subcommittee of three existing NASA Advisory Council committees, the Space and Earth Science Advisory Committee, the Space Applications Advisory Committee and the Life Sciences Advisory Committee.

The functions of the subcommittee will be to advise the NASA Office of Space Science and Applications on the new capabilities to be made available by the Space Station program and how these capabilities might be most effectively used for science and applications activities.
(from Hdqs. Release #88-20)

■

NASA Continues Rocketborne Studies of Supernova

NASA successfully launched the first of three suborbital rocket experiments, Feb. 16, from Woomera, Australia Range, commencing a second campaign to study Supernova 1987A. Two additional rocket experiments are scheduled for a launch during a launch window lasting until March 20.

The first rocketborne experiment is designed to observe x-ray emissions in the 0.3-7 keV (low-energy) bands and is the first observation of the supernova with a novel, high efficiency telescope.

The second flight is designed to study x-ray emissions in the 0.2-2keV band. This mission will use a charged-couple device imaging spectrometer and x-ray telescope used in the first campaign.

The third experiment, scheduled for launching no earlier than March 7, is designed to observe supernova emissions in the 900-1240 Angstrom band, a band not previously covered by any other instrument in the campaign.
(from Hdqs. Release #88-21)

Space Commercial Development Advisory Group Formed

A Commercial Development of Space Industry Advisory Group has been formed. It will function as a subcommittee of the NASA Advisory Council (NAC) with special emphasis on the commercial use of space.

Named as chairman of the new subcommittee is Edward Donley, former chairman and CEO of Air Products and Chemicals, Inc.

Through the NAC, the group will review the overall NASA commercial development of space program, recommend changes to enhance the program and advise on specific elements aimed at fostering the commercial development of space.

■

NASA and Japanese Space Agency Sign Remote Sensing Data Agreement

NASA and the National Space Development Agency of Japan (NASDA) recently signed an agreement for the direct reception by NASA of data from Japan's Earth Resources Satellite (ERS-1). The agreement was signed by Dr. James Fletcher, NASA administrator and Hiroyuki Osawa, president, NASDA.

NASA will have access, for research and applications demonstration purposes, to real-time data from Japan's ERS-1 synthetic aperature radar and optical sensor.

Japan's ERS-1 currently is scheduled to be launched by NASDA on the H-1 launch vehicle in early 1992.

(from Hdqs. Release #88-12)

■

NASA Selects Small Business Innovation Research Projects

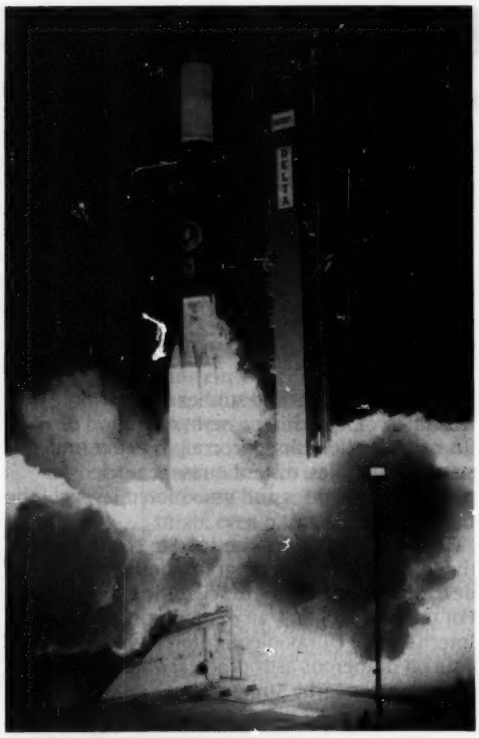
NASA has announced the selection of 26 research proposals for negotiation of Phase II contract awards in their Small Business Innovation Research (SBIR) program. Included are 25 small high-technology firms located in 14 states.

The 26 selections, valued at approximately $12 million, add to 59 selections announced on Dec. 10, 1987, and bring the value of the total group of 85 selections to approximately $40 million.

SBIR objectives are to stimulate technological innovation, increase small business participation in Federal research and development programs and contribute to growth and economic strength of the private sector.

SBIR projects are procured and managed by nine NASA field centers. NASA's office of Commercial Programs, NASA Headquarters, Washington, D.C., provides overall program management.

(From Hdqs. Release #88-8)



KENNEDY SPACE CENTER, FL.— Delta 181, launched by NASA for the Strategic Defense Initiative, lifts off from Pad B on Complex 17 at 5:07 p.m. Eastern time on February 8, 1988.

■

Acting Head of NASA Aeronautics and Space Technology Named

NASA Administrator, Dr. James Fletcher, has announced the selection of Dr. William Ballhaus, Jr., as acting associate administrator for the

agency's Office of Aeronautics and Space Technology. Ballhaus has served as director of Ames Research Center, Mountain View, California.

Ballhaus will direct NASA's aeronautics and space research and technology development programs, as well as be responsible for the institutional management of NASA's Ames, Langley and Lewis research centers.

In naming Ballhaus, Fletcher said, "Dr. Ballhaus brings excellent credentials and working familiarity to this post. His leadership will be valued and well utilized during his tenure in this position and we warmly welcome him."

Ballhaus will serve in this position for an undetermined period of time. Dr. Dale Compton, Ames Deputy Director, will serve as acting director of the Center during Ballhaus' absence.
(From Hdqs. Release #88-7)

■

NASA's Colladay to Direct Defense Advanced Research Agency

Effective Feb. 1, 1988, Dr. Raymond S. Colladay left NASA to become director of the Defense Advanced Research Projects Agency (DARPA).

As associate administrator, he was responsible for direction of NASA's aeronautics and space research and technology development programs and for the institutional management of NASA's Ames, Langley and Lewis research centers.

NASA Administrator Dr. James Fletcher, commenting on Colladay's appointment as DARPA director said, "All of us at NASA appreciate the leadership and vision that Dr. Colladay has given to reinvigorate the Nation's civilian space technology program and to ensure U.S. preeminence in aviation. I know that his understanding of advanced technology and his management and leadership will continue to benefit the Nation in his capacity as director of DARPA. We wish him well in this new assignment and look forward to seeing him back at NASA at the end of this Administration."
(from Hdqs. Release #88-6)

■

NASA Engineer Proposes Miniature Spacecraft

Miniature spacecraft, about the size of a coffee can, could be launched by electromagnetic launchers to conduct dozens of different space exploration missions, according to an engineer at NASA's Jet Propulsion Laboratory (JPL), Pasadena, California.

Ross Jones, of JPL's spacecraft systems engineering section, said Earth orbiting electromagnetic launchers, or railguns, being developed for the U.S. Strategic Defense Initiative Office, would be useful in launching very small, low-cost scientific probes to various destinations in the solar system.

Drawbacks to miniature spacecraft, such as limited space for instruments, would be offset by advantages such as the speed with which their highly focused missions could be accomplished. For example, Jones estimates that a 2.2 pound spacecraft launched by an orbiting railgun would achieve an exit velocity of about six miles per second, giving the probe enough velocity to travel about 750 million miles (about the distance between Earth's and Saturn's orbits) in two years. As a comparison, the Voyager 2 spacecraft, launched by a Tital-Centaur rocket from Cape Canaveral took more than four years to travel to Saturn, and that time was possible only because of a gravity boost from Voyager's flyby of Jupiter.
(from Hdqs. Release #88-4)

■

Acceptance Tests Completed for Three Space Shuttle Main Engines

NASA has completed acceptance tests on the three main engines which will power the Space Shuttle Discovery on the next Shuttle mission, STS-26, and on Wednesday, Jan. 6, 1988, began shipping them to the Kennedy Space Center, Fla., launch site.

The final test, a full mission duration firing of main engine 2028, was performed on Dec. 23 at NASA's National Space Technology Laboratories (NSTL) in Mississippi. Detailed examination of the engine and analysis of test data have been continuing since the firing.

Acceptance testing of engines for STS-26 began in August. A sequence of three tests was successfully accomplished first on engine 2019, followed by engines 2022 and 2028. Engine 2019 arrived at Kennedy late Wednesday, Jan. 6, and all three engines are expected to be there later in January.
(from Hdqs. Release #88-2)

■

Magnesium-Rich Coating Proposed To Store Nuclear Wastes

Scientists from NASA, the Department of Energy and two universities have discovered a way to further fortify high-level nuclear waste containers, virtually ensuring the safe storage of radioactive material for thousands of years.

The key is magnesium. Magnesium provides better corrosion protection of the glass components of nuclear waste containers by a factor of 100 or more. Scientists made the discovery after the tests showed that natural glass found in the sea corroded considerably slower than that found on land. The test further showed that the seawater's magnesium constituent was the cause.

"We seem to have taken an important step toward developing an effective way to reinforce the glass component of nuclear waste containers," said Dr. Sidney Alterescu from the Office of Commercial Programs at NASA's Goddard Space Flight Center, Greenbelt, Md. "This reinforcement will prevent the glass from corroding for at least 25,000 years." Scientists say radioactivity will no longer pose a threat after that time lapse.

(from Hdqs. Release #88-3)

■

NASA Requests Proposals for Advanced X-Ray Astrophysics Facility

NASA's Marshall Space Flight Center, Huntsville, Ala., has released a two-part request for proposal to select a prime contractor for a long-duration, human-tended scientific satellite called the Advanced X-Ray Astrophysics Facility (AXAF). AXAF will be designed to observe some of the most violent processes in the universe and reveal their hidden mysteries.

Earlier x-ray satellites, Uhuru and the High Energy Astronomy Observator (HEAO) 2, gave astronomers a sample of what lay hidden from view in the x-ray spectrum. So valuable were the HEAO 2 images that astronomers recommended establishing a long lived orbiting x-ray observatory—AXAF.

As envisioned at present AXAF will be 14 feet in diameter, 45 feet long and would weigh 12-15 tons. It is to be placed into a circular orbit 320 miles above the Earth, and will operate for about 15 years. Maintenance of AXAF is to be accomplished by crews of either the Space Shuttle or the U.S. Space Station.

Contingent on congressional funding and authorization to begin, a part two contract for detailed design and construction of AXAF will be implemented in December. AXAF is scheduled to be launched in 1995 if funding and authorization are received this year.

(from Hdqs. Release #88-1)

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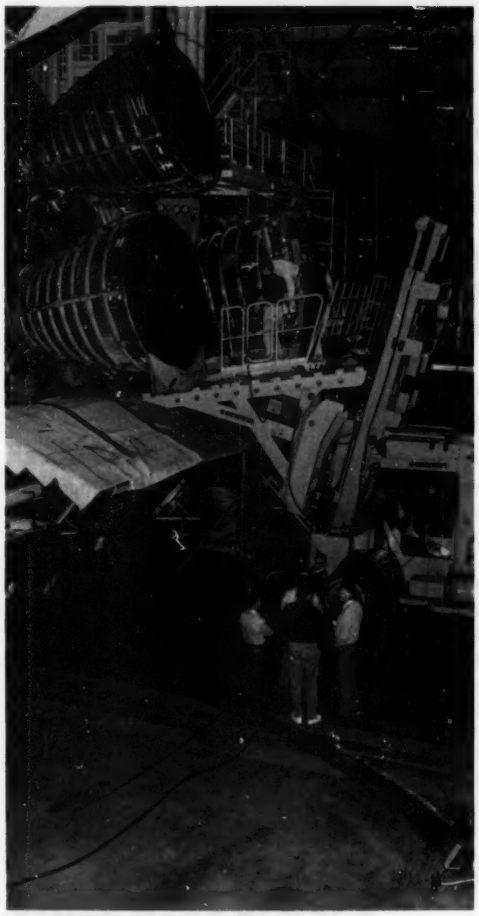

KENNEDY SPACE CENTER, FL.— KSC employees work together to install the last Shuttle main engine in Discovery's aft compartment. Discovery is currently being prepared for the STS-26 mission in bay 1 of the Orbiter Processing Facility.

HUMAN FACTORS

James M. Beggs, Past NASA Administrator, Joins SPACEHAB, Inc.

James M. Beggs, former NASA Administrator, became Chairman of the Board of Directors of SPACEHAB, Inc. on February 5, 1988.

Beggs will work closely with Jacobson and Chester M. Lee. Lee, former NASA Assistant Associate Administrator, Office of Space Flight, joined SPACEHAB, Inc. in November 1987, as Executive Vice President.

SPACEHAB, Inc. is a privately financed American corporation engaged in the design, development, manufacture, marketing and leasing of Space Shuttle modules that will be used as space experiment laboratories to perform "man-tended" research and development on new commercial products manufactured in space, such as semiconductor crystals, polymers, protein crystal growth, optical crystals and thin films. ■

Levine Named Among 1987 Top Technology Talents

Dr. Joel S. Levine, senior researcher at NASA's Langley Research Center, has been selected as one of the Top Ten Technology Talents of 1987 by *Washington Technology* magazine. The magazine selected 10 scientists who represent a broad spectrum of technological research from the nearly 80 nominations submitted by more than 50 organizations in the Washington, D.C., Virginia and Maryland area.

Levine was selected for "his pioneering research into the origin and evolution of the Earth's atmosphere."

Now a senior research scientist in the Atmospheric Sciences Division at Langley, Levine began his NASA career in July 1970. He is the author or co-author of more than 100 technical papers. The recipient of numerous awards, Levine received the H.J.E. Reid Award for writing Langley's outstanding research paper in 1974. He has also received several NASA awards including an Exceptional Scientific Achievement Medal. In 1982, he became the youngest recipient of the New York Academy of Sciences' Halpern Award. ■

Wojtalik Named Manager of Hubble Space Telescope Project Office, Olivier New Deputy

Fred S. Wojtalik has been named manager of the Hubble Space Telescope Project Office at the Marshall Space Flight Center in Huntsville, Ala. He has served as deputy manager of the office since April 1986.

Jean R. Olivier has been named Deputy Managerto replace Wojtalik. Olivier will continue to serve as chief engineer for the Hubble Space Telescope Project as an additional assignment pending selection of a replacement.

Marshall Center has overall responsibility for NASA's Hubble Space Telescope Project, including its development, assembly and initial check-out and verification once placed in orbit.

The telescope is scheduled to be deployed from the Space Shuttle orbiter Discovery on flight STS-31 in June 1989. With a life expectancy of 15 years, the space telescope will enable astronomers to see objects up to 30 times better than now possible with the best Earth-based telescopes. ■

New Small Business Advisor

Effective February 1, 1988, Mr. Franz Hoffman, formerly Head of the Procurement Analysis Branch at the Goddard Space Flight Center transferred to Headquarters, Office of Small and Disadvantaged Business Utilization. He replaced Mr. Judson O. Harrison, (now employed with Dest Corporation) who was the agency's Small Business Advisor.

Mr. Hoffman began his NASA career at the Goddard Space Flight Center in 1969, working for various space flight projects before becoming the Project Support Manager (PSM) for the Interplanetary Monitory Platforms (IMPS).

In his new position as Small Business Advisor, Mr. Hoffman will be the manager of NASA's Small Business Program, and Labor Surplus Area Program, in implementing policies as set forth in Federal legislation, executive orders and administrative and procurement regulations. ■

ANOTHER DIVIDEND FROM AIR & SPACE

Cool Suit

Research and development in aeronautics and space have provided numerous benefits for all Americans — and a tiny percentage of the tax dollar. Here is an example.

It gets pretty hot in a racing car. The powerful engine is, of course, the big heat contributor but there are other factors, such as aerodynamic design measures that detour cooling air away from the cockpit. Temperatures in the cockpit of 130-140 degrees Fahrenheit are not unusual and an actual thermometer reading at one race last year showed an astonishing 215 degrees. At such temperatures, drivers' elevated body temperatures can cause fatigue, dehydration and even collapse.

So more and more drivers are taking to "cool suits"—helmet liners and/or body vests through which a fluid circulates, cooled by a refrigeration unit and pumped through tubes to the garments. Cool units have been used by Ayrton Senna, winner of the 1986 Detroit Grand Prix and Dale Earnhardt, 1986 NASCAR Winston Cup champion. Their Carlson Personal Cooling Systems, which are based on aerospace technology, are supplied by Carlson Technology Inc., Livonia, Michigan, a company that specializes in customized cooling systems for auto, boat and airplane racing teams.

EMU SUIT—Extravehicular mobility unit (EMU). This is a front view of a subject demonstrating the application of the liquid-cooled undergarment which precedes the outer portions of the spacesuit in the donning process.

Motor racers tried for years to find an effective method of body cooling but early systems were unreliable and too heavy and bulky for race car use. Dennis Carlson, president of Carlson Technology, sought to develop an effective system after a driver blacked out in the 1978 Brazilian Grand Prix. He learned of cool suit research performed by Ames Research Center and a contractor, Acurex Corporation. Under contract to Ames, Acurex developed a heat-stress alleviating liquid-cooled helmet liner for military pilots after a series of accidents in Vietnam had suggested head exhaustion as the cause. The system, which pumped a cooled fluid through channels in the helmet liner, proved effective in eliminating 40-60 percent of stored body heat.

In 1980, William Elkins, a key developer of the cooling system as an Acurex employee, left the company to form Life Support Systems, Inc., Mountain View, California. LSSI supplies helmet liners and vests to Carlson Technology. The latter company customizes a complete interior cooling system, including hardware, controls and other components tailored specially to the requirements of the user. Acceptance of the Personal Cooling System is growing, says Dennis Carlson, as is the number of success stories. Last year the winners of 12 major racing championships used Carlson cooling systems; in one race alone—the 1986 Talladega 500—there were 24 Carlson systems in use, compared with 5 in the prior year.

™Cool Head is a trademark of Life Support Systems, Inc.